LETTERS TO THE EDITOR.

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The Eclipse-Wind.

ALTHOUGH meteorological observations during total eclipses of the sun are of secondary importance, the changes of temperature and humidity being well known, yet it is still uncertain whether those changes do occur in atmospheric pressure, and, consequently, of wind, which, theoretically, ought to result from the sudden chilling of the air by the passage of the moon's shadow, and the consequent increased barometric pressure out of which the wind should blow in all directions.

The letter of Mr. J. W. Evans, in NATURE of December 28, 1899, describing his observations during the Indian eclipse of 1898 is an interesting contribution to the subject of the "eclipse-wind," and brings to mind the special investigations undertaken by Prof. Winslow Upton and myself during the total solar eclipses of August 19, 1887, in Russia, and of January 1, 1889, in California, the results of which are described, respectively, in *Amer. Meteor. Journal*, vol. iv., and in *Annals Astron. Observatory of Harvard College*, vol. xxix. No. 1. Aneroid barometers, including a recording instrument, all with open scales, were used, and, in addition to the anemometer, a recording wind-vane was taken to California. There the sky was clear, but in the Russian eclipse it was heavily clouded. As regards the atmospheric pressure, it must be said that, while in both eclipses minute rises occurred during the total phase, yet they cannot be attributed with certainty to its influence, since similar fluctuations occurred on other days. As regards the wind, the eclipse appeared to produce an appreciable effect, for the wind backed (contra-clockwise) before totality, and veered (clockwise) to its original direction afterwards, its velocity diminishing as the eclipse progressed. This is what would be expected to happen at a station situated near the central path of a shadow moving north-east. In both eclipses it was nearly calm during totality.

With the hope of settling these questions, the writer joined the Harvard Observatory party that observed the total solar eclipse of April 16, 1893, in Chile, where not only was clear weather assured, but the regular diurnal period of the barometer afforded an excellent opportunity to study any non-periodic disturbance due to the eclipse. Besides the previous instruments, Richard's "statoscope," or differential barograph, was employed, with which, when the temperature is kept constant or allowed to change at a uniform rate, variations of pressure approximating 0·025 millimetre (1/1000 inch) of mercury are recorded. In order to secure a free exposure in all directions for the observations of wind, the station was located on the summit of a mountain. Notwithstanding perfect conditions—the day being clear, and a counterpart of those preceding and following—no unusual changes in pressure during any of the phases of the eclipse could be detected, and if any variation occurred, it was insufficient to disturb the regular diurnal period, and must have been of the order of a thousandth of an inch. The record of wind direction again showed a backing of the wind prior to totality, and a veering round afterwards; but as these oscillations were not infrequent at other times, they cannot be ascribed certainly to the eclipse. The wind reached its minimum velocity soon after the first contact of the moon's limb, and steadily increased until after the fourth contact.

While these observations seem to prove that any change in the atmospheric pressure during a total solar eclipse is so small as to escape measurement, yet there does appear to be evidence of changes in the wind. Mr. Evans observed a contrary rotation of the wind to that described above; and the reports of the changes in wind during many eclipses, which were collected by the late Mr. Ranyard (*Memoirs Roy. Astron. Soc.* vol. xli. chap. xxxv.), are very contradictory.

Therefore, it would be interesting if, on May 28, observers along the path of totality in the United States and elsewhere would make frequent observations of the direction and strength of the wind. Still more valuable data could be obtained from a few self-recording wind-vanes and anemometers exposed high enough above the ground to be free from local influences.

A. LAURENCE ROTCH.

Blue Hill Meteorological Observatory, U.S.A., April 3.

Lord Kelvin's Origin of Granite.

IT is a sound maxim that if you want a thing done you must do it yourself. So, as no expert has replied to my query as to the soundness of Lord Kelvin's theory of granite, propounded in my letter of February 23, I have consulted a big Dana's "Mineralogy" with the following results.

It may be premised that Lord Kelvin assumes for his liquid lava a specific gravity of 2·50, but as according to Dana the basaltic lava of Kilauea is in one case as high as 3·20, the primeval liquid lava may have averaged 2·60.

Although 2·50 will work out well enough, 2·60 is much more striking as an illustration of the effect of the assumed convection currents upon volcanic minerals.

The following is a list of volcanic minerals in the order of their density, with a rough indication of their composition so far as soda, potash, lime, magnesia and iron are concerned:—

Nosean	Soda	2·25–2·40
Hauyne	Soda-lime	2·24–2·50
Leucite	Potash	2·44–2·56
Nepheline	Soda	2·50–2·65
Sanadine	Potash	2·56
Labradorite	Lime	2·67–2·76
Amphiboles	Magnesia, lime, iron	2·90–3·40
Pyroxenes	Magnesia, lime, iron	3·23–3·50

Free silica is represented by tridymite 2·28–2·33, instead of by the heavier quartz.

If we take 2·60 to be the specific gravity of the primeval liquid lava, the division between crystals that would float and those that would sink comes between sanadine and labradorite. Some little allowance should be made for expansion on heating.

According to these specific gravities, it would appear that the snow shower produced by the convection currents would not have the effect of silting up the lava ocean with granitic crystals set in a mother liquor of basalt, but would have the effect of differentiating the lava into light and heavy strata, until the convection currents themselves would be checked and the surface stratum, composed largely of potash and soda silicates, left free to freeze. And, we may note, that the upper stratum is composed of the raw materials of granite, while the lower stratum is composed of the raw materials of basalt.

At this point geology and petrology commence work, and what subsequently befals the primeval crust, after the advent of water and sediment, may be read between the lines of the great works of MM. Daubrée, Fouqué and Lévy.

The question of a floating crust affects no doubt the problem of the age of the earth, but that is beside my point, which is strictly confined to the origin of granite.

Torquay, April 3. ARTHUR ROOPE HUNT.

Is New Zealand a Zoological Region?

IN your issue of January 11, Mr. H. Farquhar wrote drawing attention again to the incongruity of associating New Zealand with Australia in a zoo-geographic sense. He correctly insists that the New Zealand fauna is *not* most closely allied to that of North-east Australia (Queensland). It is significant that those writers who advocate the alliance of New Zealand to Queensland have not seen either country, while those who deny such relationship have studied or travelled in both or either areas. No observer who had a first-hand knowledge of the two countries could agree with Dr. Sclater that "it is probable that the whole fauna of New Zealand has been originally derived from" Australia.

In the following number (p. 273), Dr. A. R. Wallace, writing in support of his own and Dr. Sclater's views, does not demonstrate or reaffirm their accuracy, but merely lays stress upon the inconvenience of an opposite view.

That an error is convenient is no good reason for its maintenance. Regardless of the direction in which they point, our first care must be the accuracy of facts and deductions.

But, as Dr. Wallace implies, there may be fairly laid upon destructive critics the burden of restoring by constructive work the effects of their ravages. "If," says Dr. Wallace, "antipodean naturalists restrict the 'Australian Region' to Australia and Tasmania, what shall be done with the remainder of his own Australian Region?" I have proposed (*Journ. Malacology*, iv. 1895, p. 55) that New Zealand, New Caledonia and neighbouring groups (inclusive certainly of the Solomons, perhaps of New

Guinea) might be collected into a Melanesian sub-region, and subordinated to the Oriental Region. Since I have elaborated these views in another place, I will here limit my argument to a couple of supporting references.

(1) When Dr. Wallace first returned from his Eastern travel his impression of a natural region was one "extending from the Nicobars in the north-west to San Christoval, one of the Solomon Islands, on the south-east, and from Luzon on the north to Rotti, at the south-west angle of Timor, on the south" (Report British Assoc. 1863, *Trans.* p. 107).

(2) Dr. W. Botting Hemsley has stated: "There is no doubt that the combined Fijian, Samoan and Tongan flora is eminently Malayan in character" (*Journ. Linn. Soc.* Botany, xxx. p. 211).

To map New Zealand thus as an extreme and impoverished outlier of the Oriental or Malayan Region would express but a part of her affinities, since it would ignore the Antarctic relationship. But zoo-geographic problems are too complex to be expressed in terms of colour on a map. If, however, New Zealand and related areas must be forced into one or other of the recognised divisions, then I submit that this arrangement would do less violence to nature than that accepted in the text-books.

Australian Museum. CHARLES HEDLEY.

Mercury Jet Interrupters.

My attention was attracted recently by a brief notice that appeared in NATURE of March 1 (p. 421) of a new form of mercury jet interrupter devised and placed on the market by Messrs. Isenthal, Potzler and Co.

As that form of break appeared to be of interest to the readers of NATURE, a short description of one that I designed some months ago, along similar lines, may be of interest to some.

While experimenting with wireless telegraphy an interrupter of great frequency of break seemed desirable, and as I wanted also to know the rate of interruption accurately, it was deemed best to use some form of mechanical one. After investigating several kinds, the following one was finally decided upon as the most promising:—

An iron vessel, arranged as a Mariotte flask to maintain a constant head, holding about a pint of mercury, formed one terminal and a metallic plate the other. The plate was arranged below the vessel, and the mercury fell upon it, completing the circuit. In the bottom of the flask was a row of ten holes, arranged around in a circle, with nozzles fitted into them. On a vertical shaft, concentric with the row of nozzles, a series of mica sectors were arranged, so that, when revolving, they would cut the mercury jets falling from the vessel above. These strips were placed with the line of their edges parallel to the axis of the shaft. Thus they would break the circuit in several places at the same instant, giving a very sharp break.

It was found better to break the circuit by interposing an insulator than to break by opening the circuit with a conductor, as the wear at the spark tended to keep them all equal, so they automatically adjusted themselves to the best positions.

The object of the row of jets was to get a more rapid interruption. To break a single jet in five or six places simultaneously, and at the same time with a satisfactory frequency, was found to require too great a head and velocity of jet to be practicable, so by adopting a row of ten the frequency could be increased that many times. These jets are all in parallel, and when the mica strips are revolving the head is so adjusted, by the Mariotte flask arrangement and screws on the sides of the reservoir, that at the instant of interruption of one jet, all the others are in a state of interruption; but the one directly in front of the mica strips will be the first to make the circuit. Thus it continues to break at a rapid rate.

Greater rapidity of break can easily be obtained by increasing the speed, by increasing the number of nozzles, by increasing the number of sets of mica strips, or by any combination of the three.

This form of interrupter will be found quite useful to any one desiring a known rate, high frequency interrupter.

S. M. KINTNER.

Western University of Penna, Allegheny, Pa., April 2.

Tyndall's Ice Crystals.

WOULD you, or some of your readers, kindly inform me whether the ice crystals, as shown in Tyndall's "Form of Water," p. 33, are considered to represent skeleton crystals or solid ones arranged in patterns? J. A.

Tunbridge Wells, April 14.

MARINE ZOOLOGY IN AUSTRALIA.[1]

IN these columns was noticed recently the admirable activity of the various Australian museums in making known to science the natural objects of southern lands and seas. On that occasion it was an important addition to our knowledge of mammalian palæontology—Prof. Stirling's description of *Diprotodon* remains—that was especially under discussion. Now we have to record equally important investigations in marine zoology undertaken by the staff of the Australian Museum, Sydney.

Besides "guides" and "miscellaneous publications," the Sydney Museum issues a series of "records" for minor papers; "catalogues," which are large and fully illustrated, contain descriptions of many new species, and are really in some cases monographs; and "memoirs," such as the natural history of Lord Howe Island (1889); that on the Atoll of Funafuti more recently, in ten parts; and, finally, the "Scientific Results of the Trawling Expedition of H.M C.S. *Thetis*," of which Part i. is now before us. From the introduction, by Mr. Edgar R. Waite, we learn that this expedition was the outcome of a desire on the part of the Government of New South Wales to investigate the trawl fisheries of their coast. In 1898 H.M.C.S. *Thetis* was commissioned, the expedition was financed by the Colonial Government, and an experienced North Sea trawler was obtained, upon whose skill depended the successful working of the apparatus. Finally, the Trustees of the Australian Museum were asked to appoint one of their officers to join the expedition, and Mr. Waite was selected to act in that capacity. He tells us how a large and valuable collection was obtained and preserved (not without considerable difficulty, as experience showed that the *Thetis* was a most unsuitable vessel for the purpose), and promises that the various groups will be dealt with in detail by members of the museum staff in succeeding parts of the memoir. An "Addendum to the Introduction" on fishing with electric light—not yet brought to perfection—concludes with the sentence: "I lowered an incandescent lamp in a tow-net, and obtained a number of small invertebrates, thus reproducing the experiments conducted at the Liverpool Biological Station" (p 132). He does not tell us what the forms were which were obtained in the illuminated net. In the Liverpool experiments they were all actively swimming forms provided with eyes.

The remainder of the present part contains Mr. Waite's report upon the fishes. One hundred and seven species were taken, representing ninety-five genera, including one new genus, viz. *Paratrachichthys* (formed for *Trachichthys trailli*, Hutton). Nine new species are described, a number of others are new records for the colony. But it is very evident that, as Mr. Waite says, "the interest of the results is, however, not exhausted by an enumeration of the new or rare species; the expedition has been the means of materially extending the known range, both geographically and vertically, of several of our common food fishes. The breeding season of one or two species has been ascertained, . . . and our knowledge of the habits of the soles has also been extended." As the trawling was for the most part not carried on in really deep water, but within the limit reached by line fishermen, the scientific and economic success was all the more marked. As an example of the latter may be taken the information as to *Zeus australis*, a rare and valuable food fish, which was found under circumstances indicating that it may yet take its place as a popular and cheap food fish.

Of the nine new species described, perhaps the most interesting is the "ghost-shark" (*Chimaera ogilbyi*),

[1] Australian Museum, Sydney. Memoir IV. "Scientific Results of the Trawling Expedition of H.M.C.S. *Thetis*," &c. Part i. Pp. 132; 31 plates, frontispiece, and a chart. (Sydney, 1899.)